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# TABLE OF CONTENTS

## EXECUTIVE SUMMARY

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Site Description and Physical Setting	
1.2	Site History	
1.3	Objectives and Scope of Work	
<b>2.0</b>	<b>INVESTIGATIVE PROCEDURES AND RESULTS .....</b>	<b>3</b>
2.1	Soil Boring / Monitoring Well Installation	
2.2	Soil-Screening Results	
2.3	Groundwater Characteristics	
2.4	Sampling and Analysis	
<b>3.0</b>	<b>SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT .....</b>	<b>7</b>
3.1	Sensitive Receptor Survey	
3.2	Risk Assessment	
<b>4.0</b>	<b>CONCLUSIONS .....</b>	<b>9</b>
<b>5.0</b>	<b>RECOMMENDATIONS.....</b>	<b>10</b>

## FIGURES

Figure 1	Site Location Map
Figure 2	Site Map with Monitoring Well Locations
Figure 3	Groundwater Contours
Figure 4	Contaminant Distribution

## APPENDICES

Appendix A	Boring Logs and Well Construction Diagrams
Appendix B	Laboratory Analytical Reports

## EXECUTIVE SUMMARY

Environmental Compliance Services, Inc. (ECS) has prepared this Initial Site Investigation (ISI) report on behalf of Bradford Oil Company (Bradford Oil) for work performed at the Waits River General Store located on VT Route 25 Waits River, Vermont. The Waits River General Store is a gasoline retail convenience store currently owned and operated by Bill and Donna MacDonald. The ISI was performed at the request of the Vermont Department of Environmental Conservation (VTDEC), to investigate petroleum contamination reported by Gary Fontaine of Bradford Oil during the 1994 removals of a 1,000-gallon and 3,000-gallon gasoline UST owned by Bradford Oil. Two additional 1,000-gallon gasoline USTs were reportedly removed from the site in 1984, and were reported by Bradford Oil to be the source of petroleum contamination discovered in the 1994 UST removals. One 6,000-gallon gasoline UST owned by Jock Oil currently exists onsite, and is located in the area of the former 3,000-gallon UST.

The ISI included the screening of soil from six borings, the installation and sampling of four monitoring wells (MW-1 through MW-4), and the onsite water supply well for petroleum-related volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH), and an evaluation of potential threats to nearby sensitive receptors. Based on the results of the site investigation described above, ECS concludes the following:

- Only one petroleum-related VOC, 1,3,5-Trimethylbenzene (1,3,5-TMB) was detected at 7.7 micro grams per liter (ug/l), which is above Vermont Groundwater Enforcement Standard (VGES) of 4 ug/l. The VGES exceedance was detected in monitoring well MW-2, which is located immediately down gradient of the former 3,000-gallon UST, and current 6,000 gallon UST. The only other VOC detected was 1,2,4-TMB in MW-2 at 2.5 ug/l. No total petroleum hydrocarbons (TPHs) were detected in any groundwater samples. The concentrations of petroleum-related VOCs detected in monitoring well MW-2 are not uncommon at active gasoline retail facilities, and could be the result of incidental overfills during refueling events.
- No petroleum-related VOCs or TPHs were detected in groundwater immediately downgradient of the two former 1,000-gallon USTs removed in 1984.
- No soil boring or monitoring well could be installed at the former location of the 1,000-gallon UST removed in 1994 because access was blocked by a dumpster, and concerns about subsurface utilities. However, based on the June 2004 groundwater elevation data, MW-2 is located downgradient of this UST. The 1,000-gallon UST was located immediately east of the former 3,000 gallon UST, and current 6,000-gallon UST.
- No petroleum-related VOCs were detected the onsite private overburden supply well, located approximately 150 feet off the southwest corner of the building. The risk of human exposure from the localized groundwater VOCs contamination is low since no VOCs were detected in Monitoring wells MW-3 and MW-4, which are located between the onsite supply well and the area of apparent localized VOC contamination at MW-2.
- During the field activities, the soils generally consisted of yellow brown and brown sand with gravel overlying well-graded and poorly graded sand. Varying amounts of clay was encountered in SB-6 located approximately 30 feet southwest of the 1984 USTs. Refusal was met at 16 to 18 feet below ground surface in MW-1, MW-2, MW-3, and SB-5 on presumed bedrock.
- PID soil headspace readings ranged from non-detect to 529 parts per million (ppm). The highest PID readings were recorded in the saturated zone at MW-2 soil boring. No other elevated PID readings above 2 ppm were obtained in the other soil borings or well installations. The risk of human exposure to the residual soil contamination is low since the contamination is at a depth of 14 feet.

## EXECUTIVE SUMMARY

- The groundwater in the unconfined surficial aquifer at the site appears to flow generally southwest toward the Waits River. The average horizontal hydraulic gradient is approximately 13 percent.
- No visual evidence petroleum discharge (i.e., oily sheen) was observed at the bank or in the river at locations downgradient of the site on 3 June 2004. The Waits River is located approximately 200 feet south of the former and current UST locations. Based on the distance to the river, and the low levels of VOC contamination the risk of environmental impact to the river is low.
- At least nine private supply wells are located within ½-mile of the site. Based on the relative locations of the supply wells to the former UST area, and the direction of overburden groundwater flow, the risk of VOC impact to these wells is low.

On the basis of the conclusions stated above, ECS recommends that the following activities be performed before the site would be eligible for a Site Management Activity Completed (SMAC) designation:

1. A confirmatory groundwater-sampling event should be conducted in the Fall of 2004 to confirm the June 2004 results. Monitoring wells MW-2, MW-3, MW-4 and the Waits River General Store supply well should be sampled. In addition, the offsite water supply well at the residence located immediately east of the General Store should be sampled. The groundwater samples should be submitted for laboratory analysis of VOCs using EPA Method 8021B.
2. Upon completion of the Fall 2004 sampling event, a summary report should be prepared which includes relevant tables and figures, and identifies an appropriate course of action for the site. If similar results are obtained during the Fall 2004 monitoring event then the site would be eligible for a SMAC.
3. A copy of this report should be forwarded to Mr. and Mrs. MacDonald and the VTDEC.

## INTRODUCTION

Environmental Compliance Services, Inc. (ECS) has prepared this report of an Initial Site Investigation (ISI) performed at the Waits River General Store located on VT Route 25 Waits River, Vermont (Figure 1). This report has been prepared on behalf of Bradford Oil Company (Bradford Oil), of Bradford, Vermont. Bill and Donna MacDonald currently own and operate the Waits River General Store, which is a gasoline retail convenience store. The ISI was performed following the discovery of petroleum contamination during the removal of two permitted gasoline underground storage tanks (USTs) in 1994, having capacities of 1,000 and 3,000-gallons (Figure 2). Two additional 1,000-gallon gasoline USTs were reportedly removed from the site in 1984, and were reported by Bradford Oil to be the source of petroleum contamination discovered in the 1994 UST removals. One 6,000-gallon gasoline UST owned by Jock Oil currently exists onsite, and is located in the area of the former 3,000-gallon UST..

The ISI included the screening of soil from six borings, the installation and sampling of four monitoring wells, and an onsite supply well for petroleum-related volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPHs), and an evaluation of potential threats to nearby sensitive receptors. This work was requested by the Vermont Department of Environmental Conservation Sites Management Section (VT DEC SMS) in a letter dated 18 June 2004.

### 1.1 SITE DESCRIPTION AND PHYSICAL SETTING

Structures located on the site include a main building, which houses a residence, garage and a general store, and a smaller storage shed. The main building has a basement constructed of concrete floors and walls.

Gasoline is currently dispensed at the general store and stored in a 6,000-gallon UST located in the tank grave of the 3,000-gallon UST removed in 1994. The former 1994 USTs were located on the eastern side of the garage, south of the storage shed. The former 1984 USTs were located under the footprint of the storage shed (Figure 2).

The surrounding areas are primarily residential properties located along VT Route 25. The ground surface at the current and former UST locations is relatively flat. The ground surface west of the main building slopes to the southwest, toward the Waits River. The Waits River abuts the property on the western side, approximately 200 feet from the building.

The site and surrounding properties are serviced by private water supply wells and septic systems. Two supply wells including one active well servicing the Waits River General Store and the other reportedly abandoned well that formerly serviced an adjacent neighbor (Welch Residence), are located approximately 150 feet southwest of the building. According to the Vermont Agency of Natural Resources Internet Mapping Site of Private Wells, at least nine private water supply wells are located within a ½-mile of the site. Four wells that are identified as being on the south side of the Waits River are downgradient to the site. The closest private well to the site is located approximately 600 feet to the northeast. This well is indicated as being 255 deep. A 205 feet deep supply well owned by Gregory Manning is shown as located approximately 850 feet northwest of the site. No supply wells are shown on the database as being owned by "Welch".

### 1.2 SITE HISTORY

On 2 May 1994, Gary Fontaine of Bradford Oil Company inspected the removal of two gasoline USTs, having capacities of 1,000 and 3,000 gallons at Waits River General Store. During the tank pulls, soils

had a peak VOC concentration of 45 parts per million (ppm) as measured by a photoionization detector (PID). The average PID reading was 35 ppm. The USTs were reported to be in fair condition upon removal. A total of 100 cubic yards of petroleum-contaminated soils were stockpiled onsite; however, the limits of soil contamination were apparently not defined. No samples were submitted for laboratory analysis. It was alleged that the residual petroleum contamination discovered during the 1994 UST removals was from leaking USTs that were removed in 1984, which included two unregistered 1,000-gallon gasoline USTs. A site assessment and UST Closure report for the removal of the 1984 tanks could not be located.

Soils in the 1994 excavation consisted of sand to approximately 11 feet below grade. No groundwater or bedrock was encountered in the excavation.

According to the current site owner, Bill MacDonald, a Bobbin Mill was located adjacent to the river Bank, on the subject property in the 1950s.

### **1.3 OBJECTIVES AND SCOPE OF WORK**

The objectives of this ISI were to:

- Evaluate the degree and extent of petroleum contamination in soil and groundwater;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and,
- Identify appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these objectives, ECS has:

- Supervised the advancement of six soil borings and subsequent installation and sampling of four water-table monitoring wells (MW-1 through MW-4) and one onsite supply well for VOCs and TPHs;
- Screened subsurface soils from the soil borings for the possible presence of VOCs using a PID;
- Screened the ambient air in the basement of the onsite building for possible presence of VOCs using a PID;
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors; and,
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions, and offers recommendations for further action.

## **2.0 INVESTIGATIVE PROCEDURES AND RESULTS**

### **2.1 SOIL BORING / MONITORING WELL INSTALLATION**

On 10 May 2004, ECS supervised the completion of six soil borings and subsequent installation of four monitoring wells (MW-1 through MW-4) to initially characterize contaminant and hydrogeologic conditions at the site.

During drilling activities, the soils generally consisted of yellow brown and brown sand with gravel overlying well-graded and poorly graded sand. Varying amounts of clay was encountered in SB-6 located approximately 30 feet southwest of the 1984 USTs. Refusal was met at 16 to 18 feet below ground surface in MW-1, MW-2, MW-3, and SB-5 on presumed bedrock.

MW-1 was installed upgradient of all former/current USTs and the fuel dispenser; MW-2 and MW-3 were installed downgradient of the former 3,000-gallon and the current 6,000-gallon UST; MW-4 was installed downgradient of the two former 1,000-gallon USTs removed in 1984; SB-5 was advanced west (crossgradient) of the former 1984 USTs; and SB-6 was advanced southeast (crossgradient) of the former 1984 USTs. No soil boring or monitoring well could be installed at the former location of the 1,000-gallon UST removed in 1994 because access was blocked by a dumpster, and concerns about subsurface utilities. Due to the steep pitch of the slope south of the main building, it was not practicable to install soil borings / monitoring wells further downgradient of the former 3,000 and 1,000-gallon USTs removed in 1994.

ECS installed the soil borings using direct-push drilling methodology. Soil samples were collected continuously from each boring using four-foot long polyethylene sleeves. All down hole drilling and sampling equipment was decontaminated during use, as appropriate.

The monitoring wells were constructed with one-inch diameter polyvinyl chloride (PVC) casing and factory-slotted 0.010-inch slot screen. The tops of the screen sections were set between six and nine feet above the presumed groundwater level, if possible. Sections of solid PVC riser were added to bring the tops of the well casings to approximately 0.5 feet bgs. Clean silica #1 filter sand was placed in the borehole annulus around each well approximately two feet above the slotted interval. A granular bentonite seal, approximately one foot thick, was set above the sand pack and the remainder of the annular space was backfilled with native material.

A flush-mounted steel road box was placed over each monitoring well and cemented into place. The wells were developed using a peristaltic pump and/or pre-cleaned bailers and drop line after installation was complete. All purge water was discharged to the ground surface in the vicinity of each well.

On 25 August 2004, the monitoring wells and soil boring locations were surveyed relative to existing site features, with an azimuth accuracy of  $\pm 1.0$  feet and an elevation accuracy of  $\pm 0.01$  feet. Monitoring-well construction details are included on the soil-boring and well-construction logs in Appendix A.

### **2.2 SOIL-SCREENING RESULTS**

During the soil-boring program on 10 May 2004, PID readings ranging from zero to 529 parts per million (ppm) were obtained from soil samples collected from the soil borings. The highest PID readings were recorded on soil samples collected within the saturated zone in MW-2, located downgradient of the

former 3,000-gallon UST and the current 6,000-gallon UST. No other elevated readings over 2.0 ppm were obtained in the remaining borings.

An ECS Scientist screened soil samples from discrete intervals in each soil boring for the possible presence of VOCs using a Thermo 580B portable PID. The PID was calibrated in the field with an isobutylene standard gas to a benzene reference. Soil samples were placed into a polyethylene bag, which was then sealed, agitated, and allowed to equilibrate. The PID probe was inserted into the headspace, and the highest reading was recorded. PID screening results are included on the boring logs in Appendix A.

### 2.3 GROUNDWATER CHARACTERISTICS

Based on the hydrogeologic data, the groundwater in the unconfined surficial aquifer at the site appears to flow generally southwest toward the Waits River. A suspected anomalous water level was recorded in MW-4, which may be caused by the water table being influenced by the presence of backfill materials from the former UST excavations or other subsurface work in the area. The average horizontal hydraulic gradient is approximately 13 percent between MW-1 and MW-3. The vertical groundwater flow components at the site, and the hydraulic relationship between the shallow unconfined aquifer and the bedrock aquifer, are currently unknown.

Fluid levels were measured in the monitoring wells on 3 June 2004 to calculate the groundwater flow direction. Depths to groundwater in the on-site monitoring wells ranged from 11.31 feet (MW-4) to 13.04 feet (MW-2) below top-of-casing. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum of 100.00 feet. Water-level measurements and elevation calculations are presented in Table 1. A groundwater flow direction map was prepared using these data (Figure 3).

**TABLE 1.**  
Groundwater Elevation Data  
Monitoring Date: 3 June 2004

Well I.D.	Top of Casing Elevation	Depth to Water	Water Table Elevation
MW-1	100.00	11.37	88.63
MW-2	99.46	13.04	86.42
MW-3	98.16	12.94	85.22
MW-4	98.19	11.31	86.88

All values reported in feet relative to arbitrary site datum of 100.00 feet.

### 2.4 SAMPLING AND ANALYSIS

Groundwater samples were collected on 3 June 2004 from the newly installed monitoring wells and the onsite supply well and analyzed for the possible presence of petroleum-related VOCs.

<sup>2</sup> Vermont Groundwater Enforcement Standards (VGESs) for eight petroleum related VOCs are as follows: benzene - 5 µg/L; toluene — 1,000 µg/L; ethylbenzene - 700 µg/L; xylenes — 10,000 µg/L.; MTBE, a gasoline additive, - 40 µ/L; naphthalene — 20 µg/L; 1, 2, 4-trimethylbenzene — 5 µg/L; and 1, 3, 5-trimethylbenzene — 4 µg/L.



The Vermont Groundwater Enforcement Standard<sup>2</sup> (VGES) was exceeded for 1,3,5 trimethylbenzene (TMB) in MW-2, located downgradient of the former 3,000-gallon UST and the current 6,000-gallon UST. 1,3,5-TMB was detected at a concentration of 7.7 micrograms per liter ( $\mu\text{g/L}$ ); the VGES for this compound is 4.0  $\mu\text{g/L}$ . The only other petroleum-related VOC detected in the groundwater samples was 1,2,4 TMB, which was also detected in MW-2. The gasoline additive methyl tert-butyl ether (MTBE) was not detected in any of the wells.

No petroleum-related compounds were detected in the shallow supply well, located approximately 150 feet from the southwest corner of the building.

Analytical results are included in Table 2, and on the Contaminant-Distribution Map (Figure 4). Laboratory report forms are included in Appendix B.

**TABLE 2.**  
Summary of Laboratory Analytical Results  
Monitoring Date: 3 June 2004

Well I.D.	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	MTBE	1,3,5-TMB	1,2,4-TMB	Naphthalene	Total VOCs
MW-1	BRL<1.0	BRL<1.0	BRL<1.0	BRL<2.0	BRL	BRL<1.0	BRL<1.0	BRL<1.0	BRL<1.0	BRL
MW-2	BRL<1.0	BRL<1.0	BRL<1.0	BRL<2.0	BRL	BRL<1.0	7.7	2.6	BRL<1.0	10.3
MW-3	BRL<1.0	BRL<1.0	BRL<1.0	BRL<2.0	BRL	BRL<1.0	BRL<1.0	BRL<1.0	BRL<1.0	BRL
MW-4	BRL<1.0	BRL<1.0	BRL<1.0	BRL<2.0	BRL	BRL<1.0	BRL<1.0	BRL<1.0	BRL<1.0	BRL
Supply Well	BRL<1.0	BRL<1.0	BRL<1.0	BRL<2.0	BRL	BRL<1.0	BRL<1.0	BRL<1.0	BRL<1.0	BRL
Duplicate (MW-2)	BRL<1.0	BRL<1.0	BRL<1.0	BRL<2.0	BRL	BRL<1.0	9.8	2.6	BRL<1.0	12.4
% difference	0	0	0	0	0	0	24	0	0	19
Trip Blank	BRL<1.0	BRL<1.0	BRL<1.0	BRL<2.0	BRL	BRL<1.0	BRL<1.0	BRL<1.0	BRL<1.0	BRL
<b>VGES</b>	<b>5</b>	<b>1,000</b>	<b>700</b>	<b>10,000</b>	<b>--</b>	<b>40</b>	<b>4</b>	<b>5</b>	<b>20</b>	<b>20</b>

Notes:

Results given in micrograms per liter ( $\mu\text{g/L}$ ).

BTEX - a sum of benzene, toluene, ethylbenzene, and total xylenes

MTBE - methyl tertiary butyl ether

TMB - trimethyl benzene

TPH - total petroleum hydrocarbons (mg/L)

BRL - Below reporting limit

VGES - Vermont Groundwater Enforcement Standards, shaded area denotes exceedence of VGES

All samples collected by ECS and analyzed by Spectrum Analytical, Inc.

Prior to groundwater sample collection, the monitoring wells were purged with a disposable bailer and then sampled in accordance with ECS standard protocols. Purge water was discharged directly to the ground in the vicinity of each well. The supply well sample was collected from the pressure tank prior to the particulate and ultraviolet filter in the main building after purging the line for approximately 10 minutes. A trip blank and a duplicate sample were collected to ensure that adequate quality assurance/quality control (QA/QC) standards were maintained. Analytical results of the duplicate sample, collected from MW-2, were all within the EPA reporting limit of 30 percent of the sample results. No petroleum-related compounds were detected in the trip blank.

All field procedures were conducted in accordance with ECS standard protocols. All samples were transported under chain-of-custody in an ice-filled cooler to Spectrum Analytical, Inc. of Agawam, Massachusetts. The monitoring groundwater samples and supply well sample were analyzed for VOCs by EPA Method 8021B.

## **2.5     AMBIENT AIR SCREENING**

On 3 June 2004 an ECS Scientist screened the ambient air in the basement of the main building for VOCs using a PID. No elevated readings were observed.

ECS used a Thermo 580B portable PID calibrated in the field with an isobutylene standard gas to a benzene reference.

### 3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

#### 3.1 SENSITIVE RECEPTOR SURVEY

ECS conducted a survey to identify sensitive receptors in the vicinity of the Waits River General Store that could potentially be impacted by contamination associated with the site. The following sensitive receptors were identified in the vicinity of the property.

- The soils beneath the former UST and dispenser excavation areas;
- The shallow overburden aquifer and onsite supply well;
- The ambient air quality in the basement of the main building;
- Waits River, located 200 feet south of the site; and,
- The nearby offsite supply wells, identified as being within ½-mile of the site.

#### 3.2 RISK ASSESSMENT

ECS qualitatively assessed the risks that the residual soil and dissolved-phase subsurface contamination poses to the receptors identified above. In general, human exposure to petroleum-related contamination is possible through inhalation, ingestion, or direct contact while impacts to environmental receptors are due either to a direct release or contaminant migration through one receptor to another or along a preferential pathway.

- Soil Beneath the Former UST Excavation - Elevated VOCs were detected in soil samples collected during closure of the former 3,000-gallon and 1,000-gallon USTs. All soils were returned to the excavation. The former excavation area is presently paved and at a depth of 14 feet, and therefore; access to impacted soils in this area is restricted and presents low risk to the human health as long as this area remains capped.
- Shallow Overburden Aquifer and Onsite Supply Well – The shallow overburden aquifer in the vicinity of the former USTs is impacted by one petroleum-related VOC above VTGES. The depth to groundwater is approximately twelve feet bgs. The risk of human exposure from the localized groundwater VOCs contamination is low since no VOCs were detected in Monitoring wells MW-3 and MW-4, which are located between the onsite supply well and the area of apparent localized VOC contamination at MW-2.

The site is served by a shallow dug supply well. The well is located approximately 150 feet off of the southwest corner of the building, downgradient of the former and current UST locations. Results of the 3 June 2004 sampling of the supply well indicate that no VOCs have impacted the water supply well. Based on these results, the risk to human health is low.

- Ambient Air Quality in Basement - The basement in the main building is unfinished and appears to be limited to use as storage. No PID readings were observed during screening of the ambient air during field activities. Based on the relative low levels of VOCs in the groundwater detected at MW-2, the risk associated with potential impact of petroleum vapors in the basement is low.
- Waits River – The Waits River is located approximately 200 feet south of the main building and former/current UST area. Evidence of petroleum impact was not observed along the bank of the river or on the water surface. The downgradient extent of plume migration is not

known at this time; however, considering the low concentrations in MW-2, there is a low risk of impact to the Waits River.

- Offsite Water Supply Wells – At least nine private water supply wells are identified as being within ½-mile of the site. Four of these wells are located on the opposite (south) side of the Waits River; and are considered not be at risk. The other five wells are located upgradient from the source area, and therefore; impact to these wells is unlikely.

## 4.0 CONCLUSIONS

Based on the results of the site investigation described above, ECS concludes the following:

- Only one petroleum-related VOC, 1,3,5-Trimethylbenzene (1,3,5-TMB) was detected at 7.7 micro grams per liter (ug/l), which is above Vermont Groundwater Enforcement Standard (VGES) of 4 ug/l. The VGES exceedance was detected in monitoring well MW-2, which is located immediately down gradient of the former 3,000-gallon UST, and current 6,000 gallon UST. The only other VOC detected was 1,2,4-TMB in MW-2 at 2.5 ug/l. No total petroleum hydrocarbons (TPHs) were detected in any groundwater samples. The concentrations of petroleum-related VOCs detected in monitoring well MW-2 are not uncommon at active gasoline retail facilities, and could be the result of incidental overfills during refueling events.
- No petroleum-related VOCs or TPHs were detected in groundwater immediately downgradient of the two former 1,000-gallon USTs removed in 1984.
- No soil boring or monitoring well could be installed at the former location of the 1,000-gallon UST removed in 1994 because access was blocked by a dumpster, and concerns about subsurface utilities. However, based on the June 2004 groundwater elevation data, MW-2 is located downgradient of this UST. The 1,000-gallon UST was located immediately east of the former 3,000 gallon UST, and current 6,000-gallon UST.
- No petroleum-related VOCs were detected the onsite private overburden supply well, located approximately 150 feet off the southwest corner of the building. The risk of human exposure from the localized groundwater VOCs contamination is low since no VOCs were detected in Monitoring wells MW-3 and MW-4, which are located between the onsite supply well and the area of apparent localized VOC contamination at MW-2.
- During the field activities, the soils generally consisted of yellow brown and brown sand with gravel overlying well-graded and poorly graded sand. Varying amounts of clay was encountered in SB-6 located approximately 30 feet southwest of the 1984 USTs. Refusal was met at 16 to 18 feet below ground surface in MW-1, MW-2, MW-3, and SB-5 on presumed bedrock.
- PID soil headspace readings ranged from non-detect to 529 parts per million (ppm). The highest PID readings were recorded in the saturated zone at MW-2 soil boring. No other elevated PID readings above 2 ppm were obtained in the other soil borings or well installations. The risk of human exposure to the residual soil contamination is low since the contamination is at a depth of 14 feet.
- The groundwater in the unconfined surficial aquifer at the site appears to flow generally southwest toward the Waits River. The average horizontal hydraulic gradient is approximately 13 percent.
- No visual evidence petroleum discharge (i.e., oily sheen) was observed at the bank or in the river at locations downgradient of the site on 3 June 2004. The Waits River is located approximately 200 feet south of the former and current UST locations. Based on the distance to the river, and the low levels of VOC contamination the risk of environmental impact to the river is low.

- At least nine private supply wells are located within ½-mile of the site. Based on the relative locations of the supply wells to the former UST area, and the direction of overburden groundwater flow, the risk of VOC impact to these wells is low.

## **5.0 RECOMMENDATIONS**

On the basis of the results of this investigation and the conclusions stated above, ECS recommends the following:

4. A confirmatory groundwater-sampling event should be conducted in the Fall of 2004 to confirm the June 2004 results. Monitoring wells MW-2, MW-3, MW-4 and the Waits River General Store supply well should be sampled. In addition, the offsite water supply well at the residence located immediately east of the General Store should be sampled. The groundwater samples should be submitted for laboratory analysis of VOCs using EPA Method 8021B.
5. Upon completion of the Fall 2004 sampling event, a summary report should be prepared which includes relevant tables and figures, and identifies an appropriate course of action for the site. If similar results are obtained during the Fall 2004 monitoring event then the site would be eligible for a SMAC.
1. A copy of this report should be forwarded to Mr. and Mrs. MacDonald and the VTDEC.

## FIGURES

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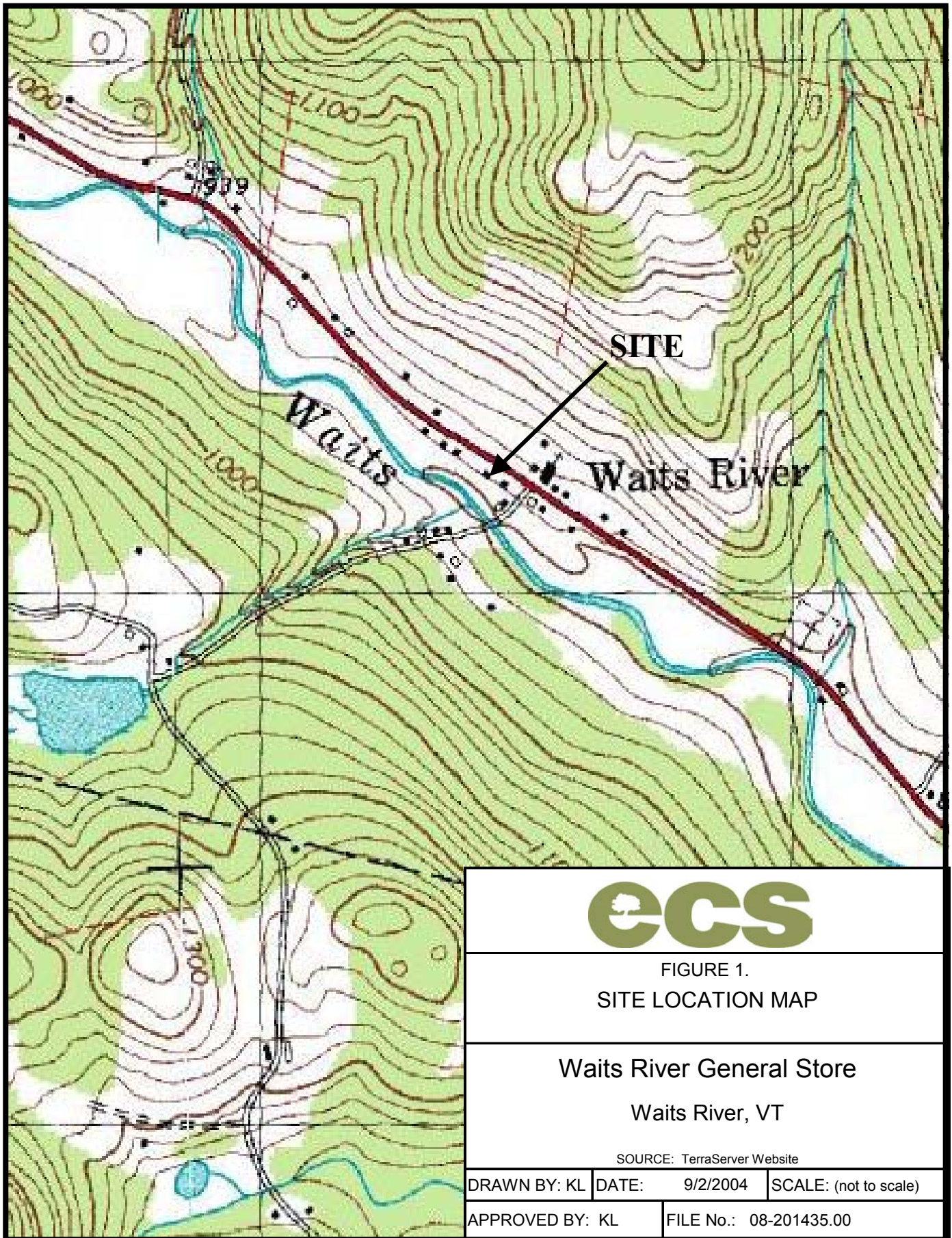


FIGURE 1.  
SITE LOCATION MAP

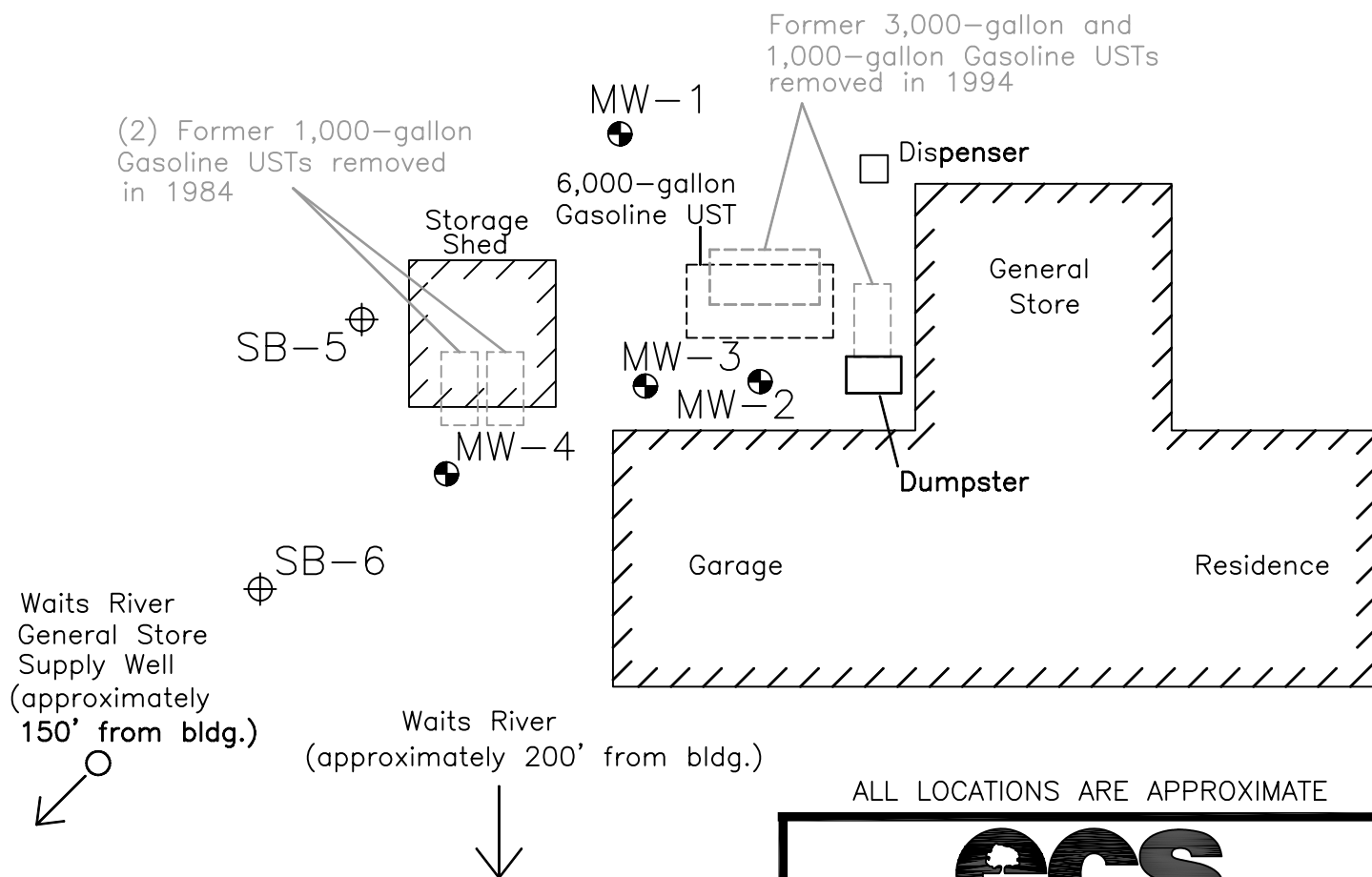
Waits River General Store  
Waits River, VT

SOURCE: TerraServer Website

DRAWN BY: KL	DATE: 9/2/2004	SCALE: (not to scale)
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APPROVED BY: KL	FILE No.: 08-201435.00
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# Vermont Rt 25



ALL LOCATIONS ARE APPROXIMATE



FIGURE 2.  
SITE PLAN

WITH MONITORING WELL LOCATIONS

Waits River General Store  
Waits River, VT

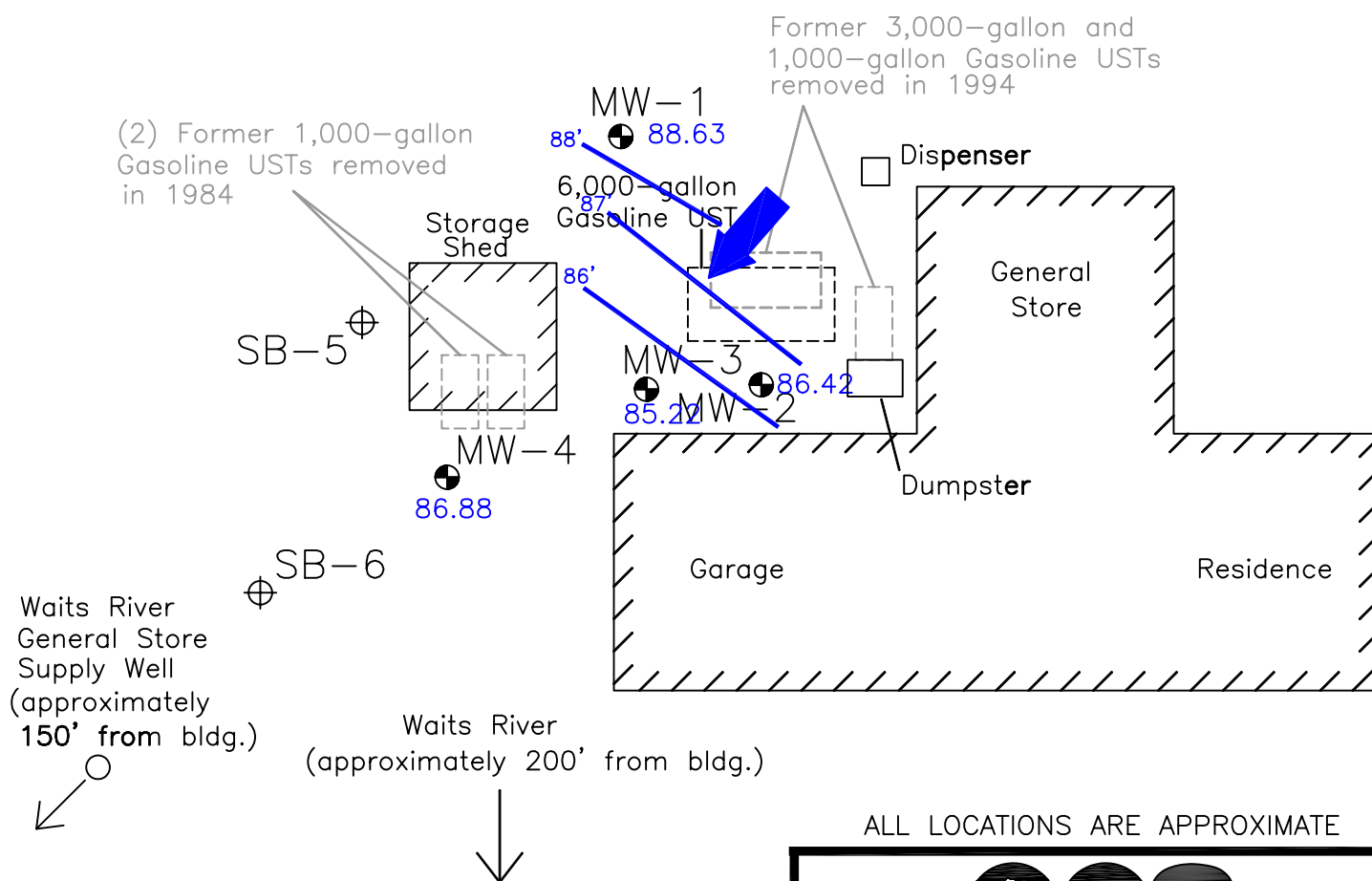
## LEGEND

- MW-2 MONITORING WELL  
SB-5 SOIL BORING



DRAWN BY: DH	DATE: 08/30/04	SCALE: 1"= 20'
APPROVED BY: KL	FILE No.: 201435.dwg	

# Vermont Rt 25



ALL LOCATIONS ARE APPROXIMATE



## FIGURE 3. GROUND WATER CONTOUR MAP

Monitoring Date: 3 June 2004

Waits River General Store  
Waits River, VT

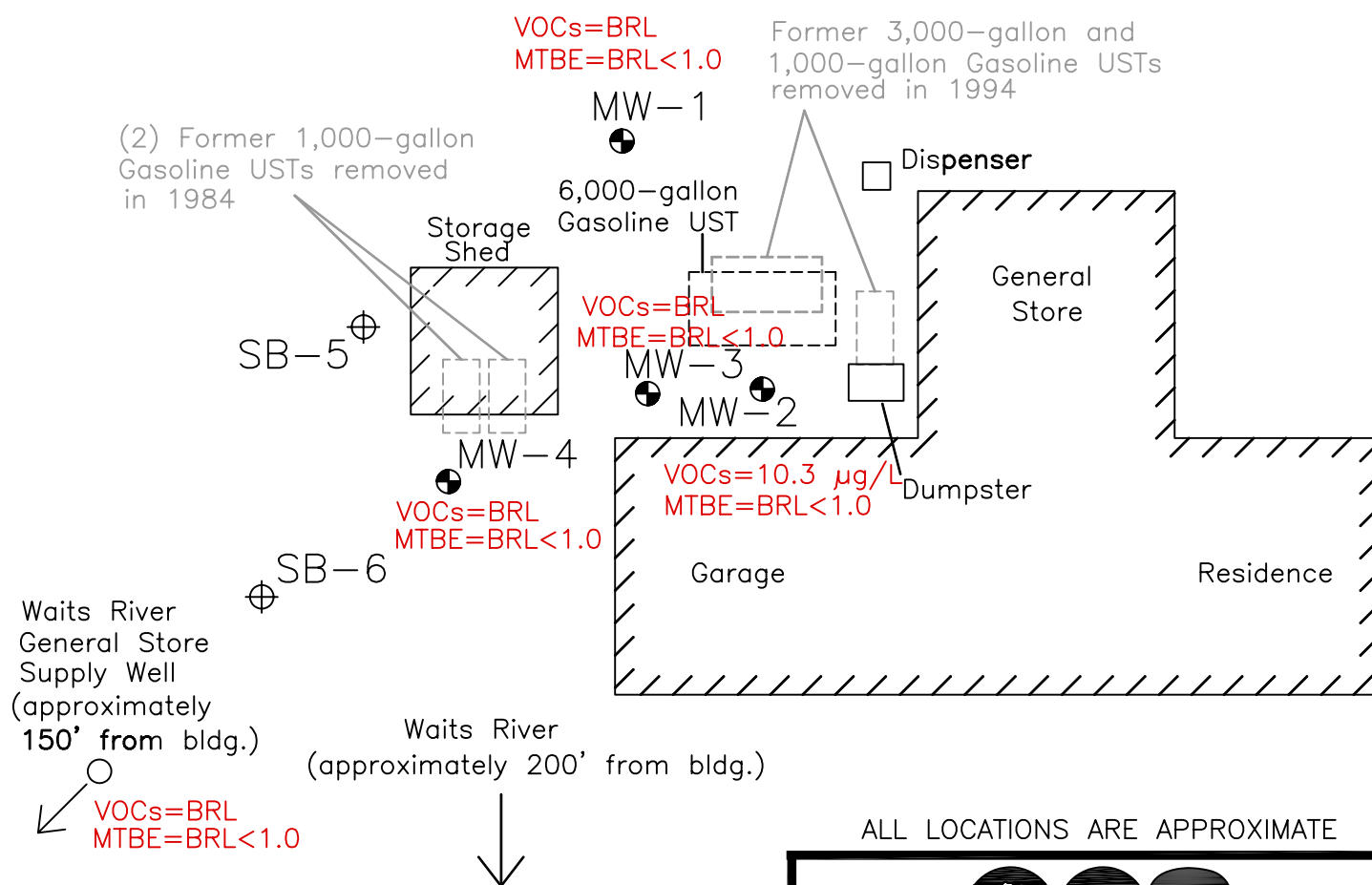
### LEGEND

- MW-2 ● MONITORING WELL
- SB-5 ⊕ SOIL BORING
- 88.63 GROUND WATER ELEVATION (FT.)
- 88' — GROUND WATER ELEVATION CONTOUR (FT.)
- ← INFERRED GROUND WATER FLOW DIRECTION



DRAWN BY: DH	DATE: 08/30/04	SCALE: 1"= 20'
APPROVED BY: KL	FILE No.: 201435.dwg	

# Vermont Rt 25



ALL LOCATIONS ARE APPROXIMATE



FIGURE 4.  
CONTAMINANT DISTRIBUTION MAP

Monitoring Date: 3 June 2004

Waits River General Store  
Waits River, VT

## LEGEND

- MW-2 ● MONITORING WELL
- SB-5 ⊕ SOIL BORING
- BRL BELOW REPORTING LIMIT
- µg/L MICROGRAMS PER LITER
- VOC TOTAL VOLATILE ORGANIC COMPOUNDS
- MTBE METHYL TERT BUTYL ETHER



DRAWN BY: DH	DATE: 08/30/04	SCALE: 1"= 20'
APPROVED BY: KL	FILE No.: 201435.dwg	

## **APPENDIX A**

---

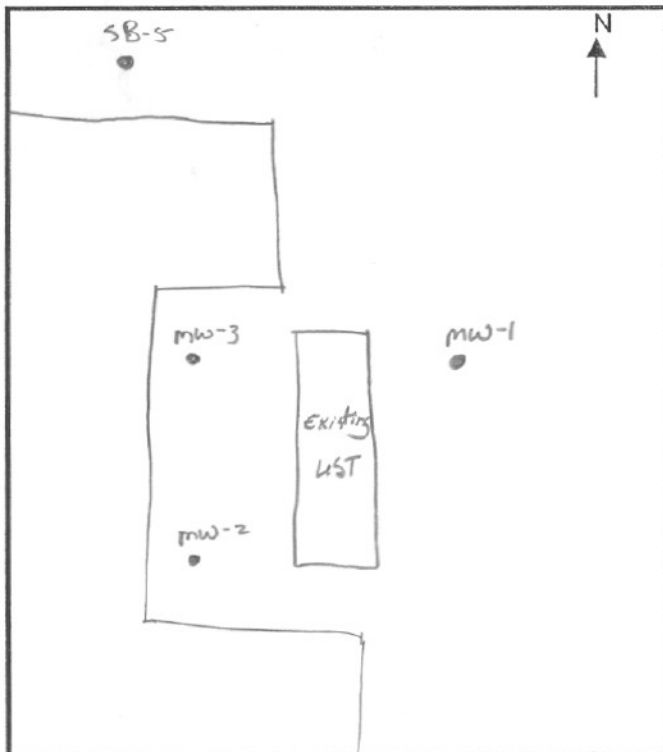
### **SOIL BORING LOGS AND WELL CONSTRUCTION DIAGRAMS**

## BOREHOLE LOG



Page 1 of 2

Project Name: <u>Waits River General Store</u>		Project Number: <u>08-201435</u>	
Client: <u>Breakford Oil</u>			
Site: <u>Waits River General Store</u>			
Borehole Location: <u>SB-1 / MW-1</u>			
Logged By: <u>Brian Buchmann</u>			
Drilling Contractor: <u>ECS Inc.</u>			
Drill Rig: <u>Eco-Probe</u>		Method: <u>Direct Push</u>	
Sampler Type: <u>Cont. Core</u>			
Borehole Diameter (inches): <u>2.25"</u>		to <u>16.00</u> feet bgs	
Drill Start Date: <u>5/10/04</u>		Time: <u>1410</u>	
Drill Finish Date: <u>5/10/04</u>		Time: <u>1430</u>	
Total Borehole Depth: <u>14.00</u>		feet bgs	
Depth to First Saturated Zone: <u>13.00</u>		Date: <u>5/10/04</u> Time: <u>1420</u>	
Depth to Water After Drilling: <u>—</u>		feet bgs	
Well Completion Date: <u>5/10/04</u>		Time: <u>1435</u>	
Screen Interval: <u>14.00-6.00</u>		feet bgs	
Total Well Depth: <u>15.95</u>		feet bgs	
Well Diameter: <u>1.00</u>		Well Casing Material: <u>PVC</u>	
Static Water Level After Well Installation: <u>11.96</u>		feet bgs	



## Notes:

Sand Pack = 16.00 - 0.00  
Screen Int. = 14.00 - 6.00  
River = 6.00 - 0.00

page 2 of 2

Logged by:

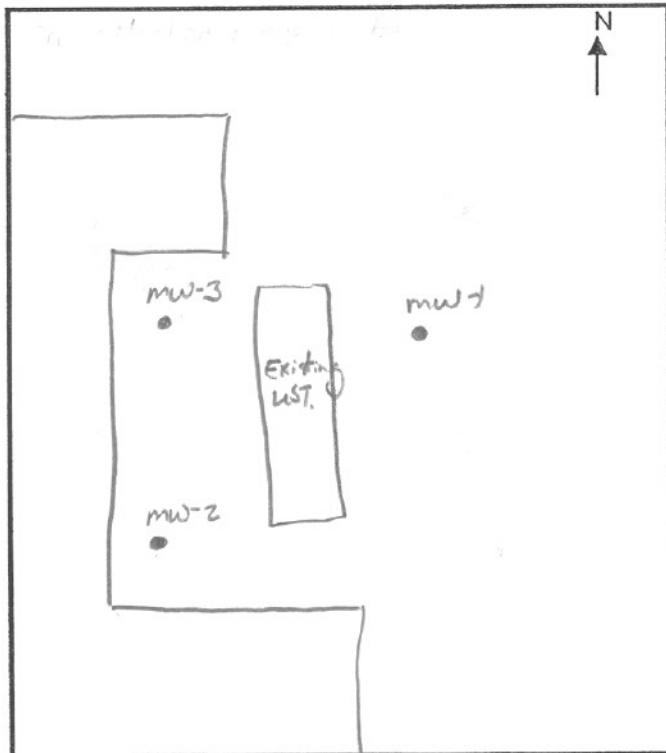
Depth	Sample Interval	PID	Blows	recovered/driven	USCS soil type	Soil Description	% gravel	% coarse sand	% medium sand	% fine sand	% silt/fines	Well Construction
0												
1		9				(0-4) Well graded sand w/ gravel; light yellow brown, moist, loose, non-plastic, massive, mostly quartz, angular to sub rounded.	15	30	30	20	5	
2												
3		2.7										
4												
5		1.8				Same as above (4-8)						
6												
7		1.8										
8												
9		0				(8-10) Same as above						
10												
11		0				(10-12) Poorly graded sand, light Brown, moist, loose, non-plastic; mostly quartz mafics, trace feldspar, angular to sub angular.	-	10	40	50	-	
12												
13		.9				(12-15) well graded sand w/ gravel, light yellow brown, wet, loose, non-plastic, angular to sub angular	15	30	25	25	5	
14												
15		.9										
16						SP (15-16) Poorly graded sand w/ silt, strong brown, wet, md. dense, slightly plastic. Refused @ 16.00	-	-	15	60	25	

## BOREHOLE LOG



Page 1 of 2

Project Name: <u>Waits River G.S.</u>		Project Number: <u>DB-201435</u>	
Client: <u>Bradford O.I.</u>			
Site: <u>Waits River General Store</u>			
Borehole Location: <u>SB-2 / MW-2</u>			
Logged By: <u>Brian Bachmann</u>			
Drilling Contractor: <u>ECS Inc.</u>			
Drill Rig: <u>Geo Probe</u>		Method: <u>Direct Push</u>	
Sampler Type: <u>Cont. Core</u>			
Borehole Diameter (inches): <u>2.25</u>		to <u>18.00</u> feet bgs	
Drill Start Date: <u>5/10/04</u>		Time: <u>1315</u>	
Drill Finish Date: <u>5/10/04</u>		Time: <u>1345</u>	
Total Borehole Depth: <u>18.0</u>		feet bgs	
Depth to First Saturated Zone: <u>15.0</u>		Date: <u>5/10/04</u> Time: <u>1335</u>	
Depth to Water After Drilling: <u>-</u>		feet bgs	
Well Completion Date: <u>5/10/04</u>		Time: <u>1355</u>	
Screen Interval: <u>18.00 - 6.00</u>		feet bgs	
Total Well Depth: <u>17.89</u>		feet bgs	
Well Diameter: <u>1.0</u>		Well Casing Material:	
Static Water Level After Well Installation: <u>13.72</u>		feet bgs	



Notes:



Project Name/Number: *Waits River 6-5*  
*08-201435*

Borehole Log

page 2 of 2

Date: 5/10/04

Well I.D. SB-2/mw-2

Logged by: Brian Bachmann

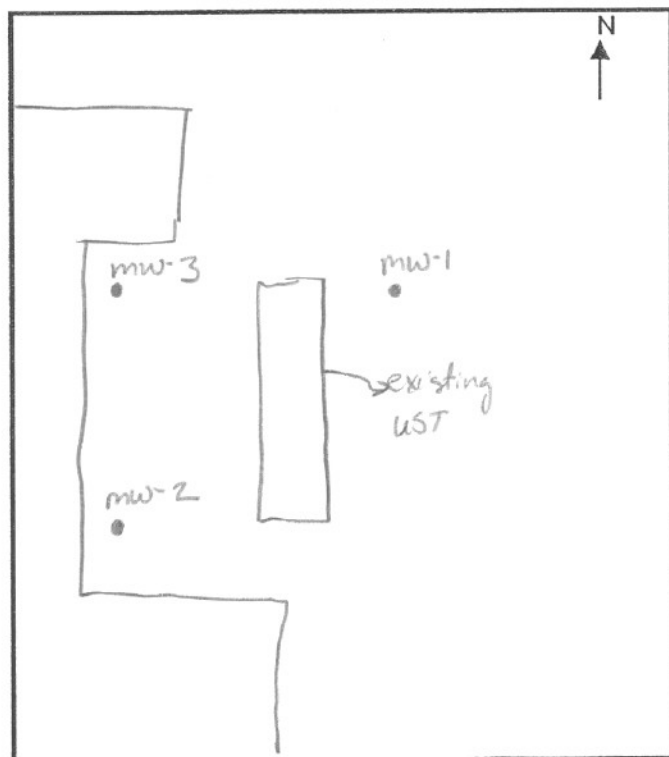
Depth	Sample Interval	PID	Blows	recovered/driven	USCS soil type	Soil Description	%gravel	% coarse sand	% medium sand	% fine sand	% silt/fines	Well Construction
0	0				SP	(0-4) Poorly graded sand w/silt, olive brown, wet, soft, plastic; mostly quartz, and micas;	-	-	40	40	20	
1												
2	0											
3												
4	0.9				SW	(4-8) Well graded sand w/gravel, yellow brown, moist, non-plastic, loose, mostly quartz and mafics, some feldspar, coarse to sub-rounded.	20	30	30	20	-	
5												
6												
7												
8	0.9					(8-12) Same as above						
9												
10	0.9											
11												
12	1.8					(12-15) Same as above						
13	1.8											
14	4/3					P.I.D. 4/3 ppm						
15	4.75				SD	(15-16) Poorly graded sand, olive grey (strong odor), soft, sticky, plastic, mostly quartz, subrounded to rounded (475 ppm), olive	-	-	30	60	10	
16	2.08											
17	5.29				SD	(17-18) Well graded sand w/gravel, brown wet, md. dense, non plastic, quartz, mafics rounded to subangular (529 ppm)	15	30	30	20	5	
18	16.90					(Refusal @ 180)						

## BOREHOLE LOG



Page 1 of 2

Project Name: <u>Waits River G.S.</u>		Project Number: <u>DB-201435</u>	
Client: <u>Bradford Oil</u>			
Site: <u>Waits River General Store</u>			
Borehole Location: <u>SB-3 / MW-3</u>			
Logged By: <u>Brian Bachmann</u>			
Drilling Contractor: <u>ECS Inc.</u>			
Drill Rig: <u>Geo-Probe</u>		Method: <u>Direct Push</u>	
Sampler Type: <u>Cont. Core</u>			
Borehole Diameter (inches): <u>7.25"</u>		to <u>16.00</u> feet bgs	
Drill Start Date: <u>5/10/04</u>		Time: <u>1225</u>	
Drill Finish Date: <u>5/10/04</u>		Time: <u>1255</u>	
Total Borehole Depth: <u>16.0</u>		feet bgs	
Depth to First Saturated Zone: <u>15.00</u>		Date: <u>5/10/04</u> Time: <u>1250</u>	
Depth to Water After Drilling: <u>-</u>		feet bgs	
Well Completion Date: <u>5/10/04</u>		Time: <u>1310</u>	
Screen Interval: <u>16.00 - 6.00</u>		feet bgs	
Total Well Depth: <u>15.85</u>		feet bgs	
Well Diameter: <u>1.00"</u>		Well Casing Material:	
Static Water Level After Well Installation: <u>13.56</u>		feet bgs	



Notes:

08-201435

## Borehole Log

page 2 of 2

Date:

Well I.D. - SB-3/MW-3

Logged by:

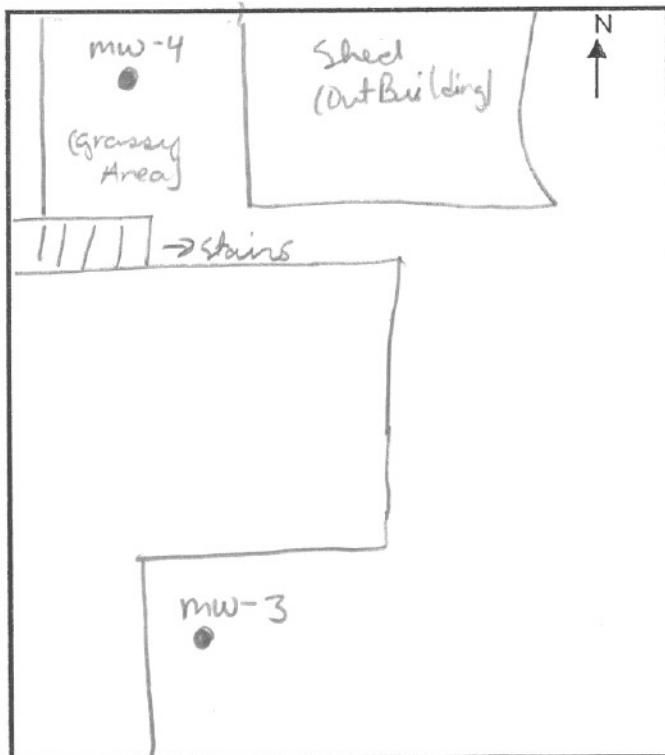
Depth	Sample Interval	PID	Blows	recovered/driven	USCS soil type	Soil Description	%gravel	% coarse sand	% medium sand	% fine sand	% silt/fines	Well Construction
0	0.0	NA	12	50		(0-4) Asphalt, w/ small band of Poorly graded sand, strong brown, moist, Loose non-plastic, Cobble @ base of Tube.	-	20	50	30	5	
1												
2												
3												
4	1.8		24	60		(4-8) Well graded Gravel w/ sand, light yellow brown, Loose, non-plastic; massive, moist, angular to subround, mostly quartz, green schists.	40	30	20	10	-	
5												
6	1.8											
7												
8	0.0		24	48		(8-12) Same as above.						
9												
10	1.8											
11												
12	0.0		18	36		(12-16) Same as above.						
13	1.8											
14	.9											
15	.9											
16						Refusal.						
17						Total Depth: 16.0						
18						Screen Interval: 16.0 - 6.0						

## BOREHOLE LOG



Page 1 of 2

Project Name: <u>Waits River G.S.</u>		Project Number: <u>DB-201435</u>	
Client: <u>Buckford Oil</u>			
Site: <u>Waits River General Store</u>			
Borehole Location: <u>SB-4</u> <u>MW-4</u>			
Logged By: <u>Brian Bachmann</u>			
Drilling Contractor: <u>ECS Inc.</u>			
Drill Rig: <u>Geo-Probe</u>		Method: <u>Direct Push</u>	
Sampler Type: <u>Cont. Core</u>			
Borehole Diameter (inches): <u>2.25"</u>		to <u>18.0</u> feet bgs	
Drill Start Date: <u>5/10/04</u>		Time: <u>1110</u>	
Drill Finish Date: <u>5/10/04</u>		Time: <u>1145</u>	
Total Borehole Depth: <u>18.0</u>		feet bgs	
Depth to First Saturated Zone: <u>15.0</u>		Date: _____ Time: _____	
Depth to Water After Drilling: <u>—</u>		feet bgs	
Well Completion Date: <u>5/10/04</u>		Time: <u>1210</u>	
Screen Interval: <u>16.85 - 4.85</u>		feet bgs	
Total Well Depth: <u>16.85</u>		feet bgs	
Well Diameter: <u>1.0"</u>		Well Casing Material: <u>PVC</u>	
Static Water Level After Well Installation: <u>12.10</u>		feet bgs	



Notes:

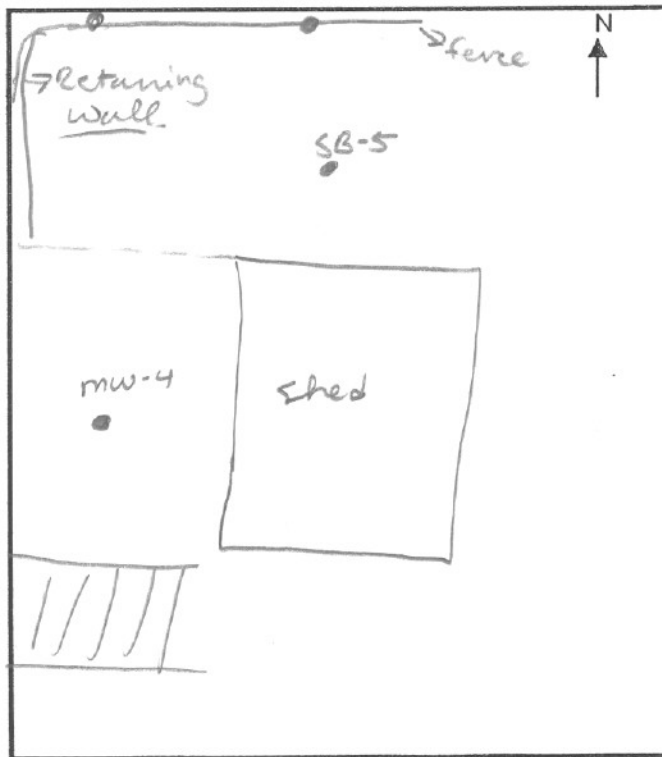


## BOREHOLE LOG



Page 1 of 2

Project Name: <u>Waits River G.S.</u>		Project Number: <u>08-201435</u>	
Client: <u>Burlford Oil</u>			
Site: <u>Waits River General Store</u>			
Borehole Location: <u>SB-5</u>			
Logged By: <u>Brian Bachmann</u>			
Drilling Contractor: <u>ECS Inc.</u>			
Drill Rig: <u>Geo-Probe</u>		Method:	
Sampler Type: <u>Cont. Core</u>			
Borehole Diameter (inches): <u>2.25"</u>		to <u>16</u> feet bgs	
Drill Start Date: <u>5/10/04</u>		Time: <u>1032</u>	
Drill Finish Date: <u>5/10/04</u>		Time: <u>1104</u>	
Total Borehole Depth: <u>16.0'</u>		feet bgs	
Depth to First Saturated Zone: <u>13.0</u>		Date: <u>5/10/04</u> Time: <u>1045</u>	
Depth to Water After Drilling: <u>N.O. fall back @ 8.5'</u>		feet bgs	
Well Completion Date: <u>No well</u>		Time:	
Screen Interval:		feet bgs	
Total Well Depth:		feet bgs	
Well Diameter:		Well Casing Material:	
Static Water Level After Well Installation:		feet bgs	



Notes:



page of

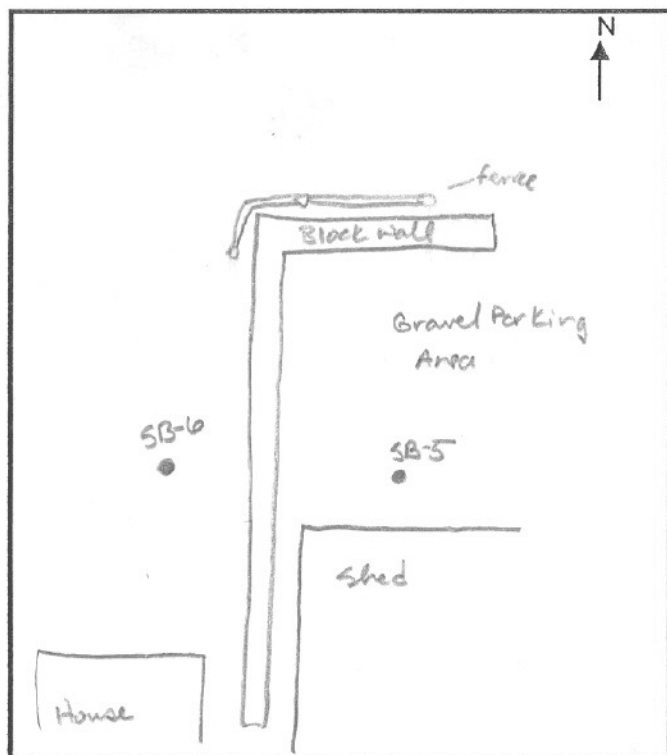
Logged by:

Depth	Sample Interval	PID	Blows	recovered/driven	USCS soil type	Soil Description	% gravel	% coarse sand	% medium sand	% fine sand	% silt/fines	Well Construction
0		0		<del>30</del> 40		(0-1) <u>Stagn Pond</u>						
1		0			SP	(1-2) Poorly graded sand w/ gravel, dark brown, dry, loose, non-plastic,	15	10	30	40	5	
2		0			SW	(2-4) Well graded sand w/ gravel, light yellow-brown, loose, non-plastic, some mica's, mostly quartz, rounded to sub-rounded.	15	30	30	25	-	
3		0										
4		1.8		<del>30</del> 40		(4-8) Same as above.						
5		.7										
6		2.7										
7		1.8										
8		1.8		<del>10</del> 40		(Same as above 8-12) 1 screening Sample due to little Rec'd						
9												
10												
11												
12		2.7		<del>40</del> 40		(12-13) Same as above → moist						
13		2.7			SP	(13-14) Poorly graded sand w/ fines. light olive brown, moist, dense, slightly plastic, mostly quartz	-	10	10	40	20	
14		1.8			SW	(14-16) Well graded sand, dark reddish brown, moist, med. dense, non-plastic, many small laminae present, mostly quartz, some mica's angular to sub-rounded.	5	30	30	30	5	
15		1.8										
16												
						Tried to advance to 20.0' Refusal @ 16.25' large rock or ledge Tube Recover'd full of water.						

# ecs

## MARIN

Project Name: <u>Waits River Gen. Store</u>		Project Number: <u>DB-201435</u>	
Client: <u>Bradford Oil Co.</u>			
Site: <u>Waits River Gen. Store</u>			
Borehole Location: <u>SB-6</u>			
Logged By: <u>Brian Bachmann</u>			
Drilling Contractor: <u>ECS Inc.</u>			
Drill Rig: <u>Geo-Probe 22</u>		Method: <u>Direct Push</u>	
Sampler Type: <u>Cont. Core</u>			
Borehole Diameter (inches): <u>2.25"</u>		to <u>13.8'</u> feet bgs	
Drill Start Date: <u>5/10/04</u>		Time: <u>0935</u>	
Drill Finish Date: <u>5/10/04</u>		Time: <u>1000</u>	
Total Borehole Depth: <u>13.8'</u>		feet bgs	
Depth to First Saturated Zone: <u>5.0</u>		Date: <u>5/10/04</u> Time: <u>0945</u>	
Depth to Water After Drilling: <u>Borehole collapse N.D.G45'</u>		feet bgs	
Well Completion Date:		Time:	
Screen Interval:		feet bgs	
Total Well Depth:		feet bgs	
Well Diameter:		Well Casing Material:	
Static Water Level After Well Installation:		feet bgs	



Notes:



page of

Logged by: Brian Bachman

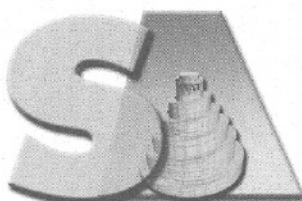
[illegible]

## **APPENDIX B**

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### **LABORATORY ANALYTICAL REPORTS**

Report Date:  
18-Jun-04 10:51



SPECTRUM ANALYTICAL, INC.

Featuring

HANIBAL TECHNOLOGY

### Laboratory Report

ECS/Marin  
65 Millet Street; Suite 301  
Richmond, VT 05477  
Attn: Joseph Hayes

Project: Waits River General Store - VT  
Project #: 08-201435

- ☒ Final Report  
☐ Re-Issued Report  
☐ Revised Report

<u>Laboratory ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Sampled</u>	<u>Date Received</u>
SA13593-01	MW-1	Ground Water	03-Jun-04 11:15	07-Jun-04 11:35
SA13593-02	MW-2	Ground Water	03-Jun-04 11:25	07-Jun-04 11:35
SA13593-03	MW-3	Ground Water	03-Jun-04 11:20	07-Jun-04 11:35
SA13593-04	MW-4	Ground Water	03-Jun-04 11:10	07-Jun-04 11:35
SA13593-05	MW-5	Ground Water	03-Jun-04 11:30	07-Jun-04 11:35
SA13593-06	Supply Well	Ground Water	03-Jun-04 11:30	07-Jun-04 11:35
SA13593-07	Trip	Ground Water	03-Jun-04 08:00	07-Jun-04 11:35

I attest that the information contained within the report has been reviewed for accuracy and checked against the quality control requirements for each method. All applicable NELAC requirements have been met.

Please note that this report contains 11 pages of analytical data plus Chain of Custody document(s).

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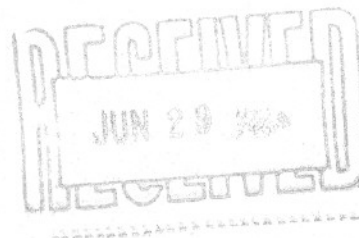
Massachusetts Certification # M-MA138/MA1110  
Connecticut # PH-0777  
Florida # E87600  
Maine # MA138  
New Hampshire # 2538  
New York # 11393  
Rhode Island # 98  
USDA # S-51435



Authorized by:

Hanibal C. Tayeh, Ph.D.  
President/Laboratory Director

Please refer to our "Quality" webpage at [www.spectrum-analytical.com](http://www.spectrum-analytical.com) for a full listing of our current certifications.



#### ENVIRONMENTAL ANALYSES

11 Almgren Drive • Agawam, Massachusetts 01001 • Operational Building & Sample Receiving  
830 Silver Street • Agawam, Massachusetts 01001 • Administrative Offices, Volatile & Air Departments  
1-800-789-9115 • 413-789-9018 • Fax 413-789-4076

Sample Identification  
MW-1  
SA13593-01

Client Project #  
08-201435

Matrix  
Ground Water

Collection Date/Time  
03-Jun-04 11:15

Received  
07-Jun-04

Analyte(s)	Result	*RDL/Units	Dilution	Method Ref.	Prepared	Analyzed	Batch	Analyst	Flag
------------	--------	------------	----------	-------------	----------	----------	-------	---------	------

# **Volatile Organic Compounds**

## Gasoline Range Organics

Prepared by method Volatiles

Gasoline Range Organics	BRL	0.08 mg/l	1	8015BM/ME4.2.17	15-Jun-04	15-Jun-04	4060883	kw	
Surrogate: 2,5-Dibromotoluene (PID)	104	70-130 %		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	105	70-130 %		"	"	"	"	"	

## Volatile Organic Compounds by 8260B

Prepared by method Volatiles

Benzene	BRL	1.0 ug/l	1	SW846 8260B	10-Jun-04	10-Jun-04	4060636	RLJ	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	95.2	70-130 %		"	"	"	"	"	
Surrogate: Toluene-d8	97.6	70-130 %		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	126	70-130 %		"	"	"	"	"	
Surrogate: Dibromofluoromethane	111	70-130 %		"	"	"	"	"	

*This laboratory report is not valid without an authorized signature on the cover page.*

\*Reportable Detection Limit      BRL = Below Reporting Limit

Page 2 of 11

Sample Identification  
MW-2  
SA13593-02

Client Project #  
08-201435

Matrix  
Ground Water

Collection Date/Time  
03-Jun-04 11:25

Received  
07-Jun-04

Analyte(s)	Result	*RDL/Units	Dilution	Method Ref.	Prepared	Analyzed	Batch	Analyst	Flag
<b>Volatile Organic Compounds</b>									
<u>Gasoline Range Organics</u>		Prepared by method Volatiles							
Gasoline Range Organics	1.6	0.08 mg/l	1	8015BM/ME4.2.17	15-Jun-04	15-Jun-04	4060883	kw	
Surrogate: 2,5-Dibromotoluene (PID)	108	70-130 %		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	101	70-130 %		"	"	"	"	"	
<u>Volatile Organic Compounds by 8260B</u>		Prepared by method Volatiles							
Benzene	BRL	1.0 ug/l	1	SW846 8260B	10-Jun-04	10-Jun-04	4060636	RLJ	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	2.6	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	7.7	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	97.6	70-130 %		"	"	"	"	"	
Surrogate: Toluene-d8	95.6	70-130 %		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	119	70-130 %		"	"	"	"	"	
Surrogate: Dibromofluoromethane	104	70-130 %		"	"	"	"	"	

Sample Identification  
MW-3  
SA13593-03

Client Project #  
08-201435

Matrix  
Ground Water

Collection Date/Time  
03-Jun-04 11:20

Received  
07-Jun-04

Analyte(s)	Result	*RDL/Units	Dilution	Method Ref.	Prepared	Analyzed	Batch	Analyst	Flag
<b>Volatile Organic Compounds</b>									
<u>Gasoline Range Organics</u>		Prepared by method Volatiles							
Gasoline Range Organics	BRL	0.4 mg/l	1	8015BM/ME4.2.17	15-Jun-04	16-Jun-04	4060928	kw	
Surrogate: 2,5-Dibromotoluene (PID)	73.6	70-130 %		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	73.6	70-130 %		"	"	"	"	"	
<u>Volatile Organic Compounds by 8260B</u>		Prepared by method Volatiles							
Benzene	BRL	1.0 ug/l	1	SW846 8260B	10-Jun-04	10-Jun-04	4060636	RLJ	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	97.2	70-130 %		"	"	"	"	"	
Surrogate: Toluene-d8	95.8	70-130 %		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	112	70-130 %		"	"	"	"	"	
Surrogate: Dibromofluoromethane	105	70-130 %		"	"	"	"	"	

This laboratory report is not valid without an authorized signature on the cover page.

\*Reportable Detection Limit BRL = Below Reporting Limit

Sample Identification

MW-4

SA13593-04

Client Project #

08-201435

Matrix

Ground Water

Collection Date/Time

03-Jun-04 11:10

Received

07-Jun-04

<i>Analyte(s)</i>	<i>Result</i>	<i>*RDL/Units</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Batch</i>	<i>Analyst</i>	<i>Flag</i>
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**Volatile Organic Compounds**Gasoline Range Organics

Prepared by method Volatiles

Gasoline Range Organics	BRL	0.08 mg/l	1	8015BM/ME4.2.17	15-Jun-04	15-Jun-04	4060883	kw	
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Surrogate: 2,5-Dibromotoluene (PID)	111	70-130 %		"	"	"	"	"	
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Surrogate: 2,5-Dibromotoluene (FID)	112	70-130 %		"	"	"	"	"	
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Volatile Organic Compounds by 8260B

Prepared by method Volatiles

Benzene	BRL	1.0 ug/l	1	SW846 8260B	10-Jun-04	10-Jun-04	4060636	RLJ	
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Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
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Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
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Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
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Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
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1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
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1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
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m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
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o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
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Surrogate: 4-Bromofluorobenzene	96.8	70-130 %		"	"	"	"	"	
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Surrogate: Toluene-d8	97.0	70-130 %		"	"	"	"	"	
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Surrogate: 1,2-Dichloroethane-d4	115	70-130 %		"	"	"	"	"	
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Surrogate: Dibromofluoromethane	104	70-130 %		"	"	"	"	"	
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\*Reportable Detection Limit      BRL = Below Reporting Limit

Page 5 of 11

Sample Identification  
MW-5  
SA13593-05

Client Project #  
08-201435

Matrix  
Ground Water

Collection Date/Time  
03-Jun-04 11:30

Received  
07-Jun-04

Analyte(s)	Result	*RDL/Units	Dilution	Method Ref.	Prepared	Analyzed	Batch	Analyst	Flag
<b>Volatile Organic Compounds</b>									
<u>Volatile Organic Compounds by 8260B</u>		Prepared by method Volatiles							
Benzene	BRL	1.0 ug/l	1	SW846 8260B	10-Jun-04	10-Jun-04	4060636	RLJ	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	2.6	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	9.8	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	99.0	70-130 %		"	"	"	"	"	
Surrogate: Toluene-d8	95.8	70-130 %		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	116	70-130 %		"	"	"	"	"	
Surrogate: Dibromofluoromethane	103	70-130 %		"	"	"	"	"	



Sample Identification  
Supply Well  
SA13593-06

Client Project #  
08-201435

Matrix  
Ground Water

Collection Date/Time  
03-Jun-04 11:30

Received  
07-Jun-04

Analyte(s)	Result	*RDL/Units	Dilution	Method Ref.	Prepared	Analyzed	Batch	Analyst	Flag
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## Volatile Organic Compounds

### Gasoline Range Organics

Prepared by method Volatiles

Gasoline Range Organics	BRL	0.08 mg/l	1	8015BM/ME4.2.17	15-Jun-04	15-Jun-04	4060883	kw	
Surrogate: 2,5-Dibromotoluene (PID)	119	70-130 %		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	120	70-130 %		"	"	"	"	"	

### Volatile Organic Compounds by 8260B

Prepared by method Volatiles

Benzene	BRL	1.0 ug/l	1	SW846 8260B	10-Jun-04	10-Jun-04	4060636	RLJ	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	94.2	70-130 %		"	"	"	"	"	
Surrogate: Toluene-d8	96.8	70-130 %		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	118	70-130 %		"	"	"	"	"	
Surrogate: Dibromofluoromethane	105	70-130 %		"	"	"	"	"	

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\*Reportable Detection Limit BRL = Below Reporting Limit

Sample Identification

Sample #  
13593-07

Client Project #

08-201435

Matrix

Ground Water

Collection Date/Time

03-Jun-04 08:00

Received

07-Jun-04

<i>analyte(s)</i>	<i>Result</i>	<i>*RDL/Units</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Batch</i>	<i>Analyst</i>	<i>Flag</i>
<b>Volatile Organic Compounds</b>									
<i>Volatile Organic Compounds by 8260B</i>									
Prepared by method Volatiles									
Benzene	BRL	1.0 ug/l	1	SW846 8260B	10-Jun-04	10-Jun-04	4060636	RLJ	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
Ethyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
Benzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	95.6	70-130 %		"	"	"	"	"	
Surrogate: Toluene-d8	95.6	70-130 %		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	120	70-130 %		"	"	"	"	"	
Surrogate: Dibromofluoromethane	107	70-130 %		"	"	"	"	"	

## Volatile Organic Compounds - Quality Control

Analyte(s)	Result	*RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 4060636 - Volatiles</b>										
<b>Blank (4060636-BLK1)</b>				Prepared & Analyzed: 10-Jun-04						
Benzene	BRL	1.0	ug/l							
Ethylbenzene	BRL	1.0	ug/l							
Methyl tert-butyl ether	BRL	1.0	ug/l							
Naphthalene	BRL	1.0	ug/l							
Toluene	BRL	1.0	ug/l							
1,2,4-Trimethylbenzene	BRL	1.0	ug/l							
1,3,5-Trimethylbenzene	BRL	1.0	ug/l							
m,p-Xylene	BRL	2.0	ug/l							
o-Xylene	BRL	1.0	ug/l							
Surrogate: 4-Bromofluorobenzene	48.9		ug/l	50.0		97.8	70-130			
Surrogate: Toluene-d8	47.9		ug/l	50.0		95.8	70-130			
Surrogate: 1,2-Dichloroethane-d4	64.2		ug/l	50.0		128	70-130			
Surrogate: Dibromofluoromethane	54.6		ug/l	50.0		109	70-130			
<b>Matrix Spike (4060636-MS1)</b>				Source: SA13593-06	Prepared & Analyzed: 10-Jun-04					
Benzene	16.1		ug/l	20.0	BRL	80.5	70-130			
Chlorobenzene	19.1		ug/l	20.0	BRL	95.5	70-130			
1,1-Dichloroethene	12.0		ug/l	20.0	BRL	60.0	70-130			QM-05
Toluene	18.5		ug/l	20.0	0.800	88.5	70-130			
Trichloroethene	18.1		ug/l	20.0	BRL	90.5	70-130			
Surrogate: 4-Bromofluorobenzene	43.6		ug/l	50.0		87.2	70-130			
Surrogate: Toluene-d8	48.0		ug/l	50.0		96.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	62.8		ug/l	50.0		126	70-130			
Surrogate: Dibromofluoromethane	54.3		ug/l	50.0		109	70-130			
<b>Matrix Spike Dup (4060636-MSD1)</b>				Source: SA13593-06	Prepared & Analyzed: 10-Jun-04					
Benzene	16.8		ug/l	20.0	BRL	84.0	70-130	4.26	30	
Chlorobenzene	18.3		ug/l	20.0	BRL	91.5	70-130	4.28	30	
1,1-Dichloroethene	11.8		ug/l	20.0	BRL	59.0	70-130	1.68	30	QM-05
Toluene	18.1		ug/l	20.0	0.800	86.5	70-130	2.29	30	
Trichloroethene	18.3		ug/l	20.0	BRL	91.5	70-130	1.10	30	
Surrogate: 4-Bromofluorobenzene	44.2		ug/l	50.0		88.4	70-130			
Surrogate: Toluene-d8	48.4		ug/l	50.0		96.8	70-130			
Surrogate: 1,2-Dichloroethane-d4	62.8		ug/l	50.0		126	70-130			
Surrogate: Dibromofluoromethane	54.4		ug/l	50.0		109	70-130			
<b>Batch 4060883 - Volatiles</b>										
<b>Blank (4060883-BLK1)</b>				Prepared & Analyzed: 15-Jun-04						
Gasoline Range Organics	BRL	0.08	mg/l							
Surrogate: 2,5-Dibromotoluene (PID)	51.2		mg/l	50.0		102	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	50.8		mg/l	50.0		102	70-130			
<b>Duplicate (4060883-DUP1)</b>				Source: SA13492-07	Prepared & Analyzed: 15-Jun-04					
Gasoline Range Organics	BRL	0.08	mg/l		0.009			0.00	30	
Surrogate: 2,5-Dibromotoluene (PID)	55.7		mg/l	50.0		111	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	55.2		mg/l	50.0		110	70-130			
<b>Matrix Spike (4060883-MS1)</b>				Source: SA13492-07	Prepared & Analyzed: 15-Jun-04					
Gasoline Range Organics	303		mg/l	310	9.00	94.8	0-200			
Surrogate: 2,5-Dibromotoluene (PID)	58.1		mg/l	50.0		116	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	61.9		mg/l	50.0		124	70-130			
<b>Batch 4060928 - Volatiles</b>										
<b>Blank (4060928-BLK1)</b>				Prepared: 15-Jun-04 Analyzed: 16-Jun-04						
Gasoline Range Organics	BRL	0.08	mg/l							

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\*Reportable Detection Limit      BRL = Below Reporting Limit

## Volatile Organic Compounds - Quality Control

Analyte(s)	Result	*RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
<b>Batch 4060928 - Volatiles</b>										
<b>Blank (4060928-BLK1)</b>				Prepared: 15-Jun-04 Analyzed: 16-Jun-04						
Surrogate: 2,5-Dibromotoluene (PID)	48.0		mg/l	50.0		96.0	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	48.3		mg/l	50.0		96.6	70-130			
<b>Duplicate (4060928-DUP1)</b>				Source: SA13843-01 Prepared: 15-Jun-04 Analyzed: 16-Jun-04						
Gasoline Range Organics	BRL	0.08	mg/l		0.005			0.00	30	
Surrogate: 2,5-Dibromotoluene (PID)	58.9		mg/l	50.0		118	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	58.9		mg/l	50.0		118	70-130			
<b>Matrix Spike (4060928-MS1)</b>				Source: SA13843-02 Prepared: 15-Jun-04 Analyzed: 16-Jun-04						
Gasoline Range Organics	307		mg/l	310	6.00	97.1	0-200			
Surrogate: 2,5-Dibromotoluene (PID)	44.0		mg/l	50.0		88.0	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	47.2		mg/l	50.0		94.4	70-130			

## Notes and Definitions

QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
BRL	Below Reporting Limit - Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
NR	Not Reported
RPD	Relative Percent Difference

Laboratory Control Sample (LCS): A known matrix spiked with compound(s) representative of the target analytes, which is used to document laboratory performance.

Matrix Duplicate: An intra-laboratory split sample which is used to document the precision of a method in a given sample matrix.

Matrix Spike: An aliquot of a sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Method Blank: An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

Method Detection Limit (MDL): The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.

Reportable Detection Limit (RDL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The RDL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the RDL analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample RDLs are highly matrix-dependent.

Surrogate: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. These compounds are spiked into all blanks, standards, and samples prior to analysis. Percent recoveries are calculated for each surrogate.

Validated by:  
Hanibal C. Tayeh, Ph.D.  
Nicole Brown



SPECTRUM ANALYTICAL, INC.

Featuring

HANIBAL TECHNOLOGY

## CHAIN OF CUSTODY RECORD

Page 1 of 2

## Special Handling:

- ☒ Standard TAT - 7 to 10 business days  
☐ Rush TAT - Date Needed: \_\_\_\_\_  
· All TATs subject to laboratory approval.  
· Min. 24-hour notification needed for rushes.  
· All samples are disposed of after 60 days unless otherwise instructed.

Report To: ECS  
65 MILLCT ST. SUITE 301  
KILHAMOND, VT 05477

Invoice To: \_\_\_\_\_  
4000778 JMS

Project No.: 08-201435Site Name: WAITS RIVER GENERAL STORELocation: TOPSHAM/WAITS RIVER State: VTSampler(s): MIKE DORWProject Mgr.: JOE HAYES

P.O. No.: \_\_\_\_\_ RQN: \_\_\_\_\_

1=Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=Ascorbic Acid  
7=CH<sub>3</sub>OH 8= NaHSO<sub>4</sub> 9=\_\_\_\_\_ 10=\_\_\_\_\_

DW=Drinking Water GW=Groundwater WW=Wastewater  
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air  
X1=\_\_\_\_\_ X2=\_\_\_\_\_ X3=\_\_\_\_\_

G=Grab C=Composite

## Containers:

## Analyses:

## Notes:

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Preservative	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	80210 VT SCAN	8015 TPA 610						
SA13593-01	MW-1	6/3/04	11:15	G	GW	2	2					X						
↓	MW-1		11:15									X						
-02	MW-2		11:25									X						
↓	MW-2		11:25										X					
-03	MW-3		11:20									X						
↓	MW-3		11:20										X					
-04	MW-4		11:10									X						
↓	MW-4		11:10										X					
-05	MW-5		11:30									X						
✓ -06	SUPPLY WELL		09:30									X						

☐ Fax results when available to (\_\_\_\_) \_\_\_\_\_☐ E-mail results when available to \_\_\_\_\_Condition upon Receipt: ☐ Iced ☐ Ambient ☒ 13 °C

Relinquished by:

Michael P. Dorw  
UPS

Received by:

UPS  
Manil Melendy

Date:

6/4/04  
6/7/04

Time:

08:30  
11:35



SPECTRUM ANALYTICAL, INC.

Featuring

HANTAL TECHNOLOGY

## CHAIN OF CUSTODY RECORD

Page 2 of 2

## Special Handling:

☒ Standard TAT - 7 to 10 business days☐ Rush TAT - Date Needed: \_\_\_\_\_

• All TATs subject to laboratory approval.

• Min. 24-hour notification needed for rushes.

• All samples are disposed of after 60 days unless otherwise instructed.

Report To: ECS65 MILLET ST. SUITE 301RICHMOND, VT 05477

Invoice To: \_\_\_\_\_

Project No.: 08-201435Site Name: WHITE RIVER GENERAL STORELocation: WHITE RIVER/TOPSHAM State: VTSampler(s): MIKE DORANProject Mgr.: JOE HAYES

P.O. No.: \_\_\_\_\_ RQN: \_\_\_\_\_

1=Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=Ascorbic Acid7=CH<sub>3</sub>OH 8=NaHSO<sub>4</sub> 9=\_\_\_\_\_ 10=\_\_\_\_\_

DW=Drinking Water GW=Groundwater WW=Wastewater

O=Oil SW=Surface Water SO=Soil SL=Sludge A=Air

X1=\_\_\_\_\_ X2=\_\_\_\_\_ X3=\_\_\_\_\_

G=Grab C=Composite

Containers:

Analyses:

Notes:

Preservative

# of VOA Vials

# of Amber Glass

# of Clear Glass

# of Plastic

80216 VT SAN

8015 TTH GRO

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Preservative	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	80216 VT SAN	8015 TTH GRO
5A13593 - 06	SUPPLY WELL	6/3/04	09:30	G	GW	2	2					
↓ - 07	TRIP	↓	08:00	↓	↓	↓	↓				X	

☐ Fax results when available to (\_\_\_\_\_) \_\_\_\_\_☐ E-mail results when available to \_\_\_\_\_Condition upon Receipt: ☐ Iced ☐ Ambient DB °C

Relinquished by:

Received by:

Date:

Time:

Michael P. Hayes  
UPS

UPS

Maui Miley6/4/0408:306/7/0411:35